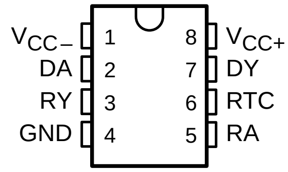
- **Meets or Exceeds the Requirements of ANSI TIA/EIA-232-C**
- **Wide Range of Supply Voltage V_{CC} = ±4.5 V to ±15 V**
- **Low Power . . . 117 mW (V_{CC} = ±9 V)**
- **Receiver Output TTL Compatible**
- **Response Control Provides:**
  - **Input Threshold Shifting**
  - **Input Noise Filtering**

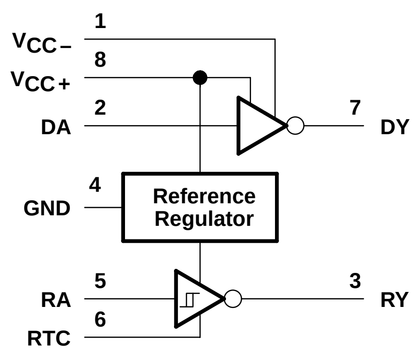
P OR PS PACKAGE
TOP VIEW



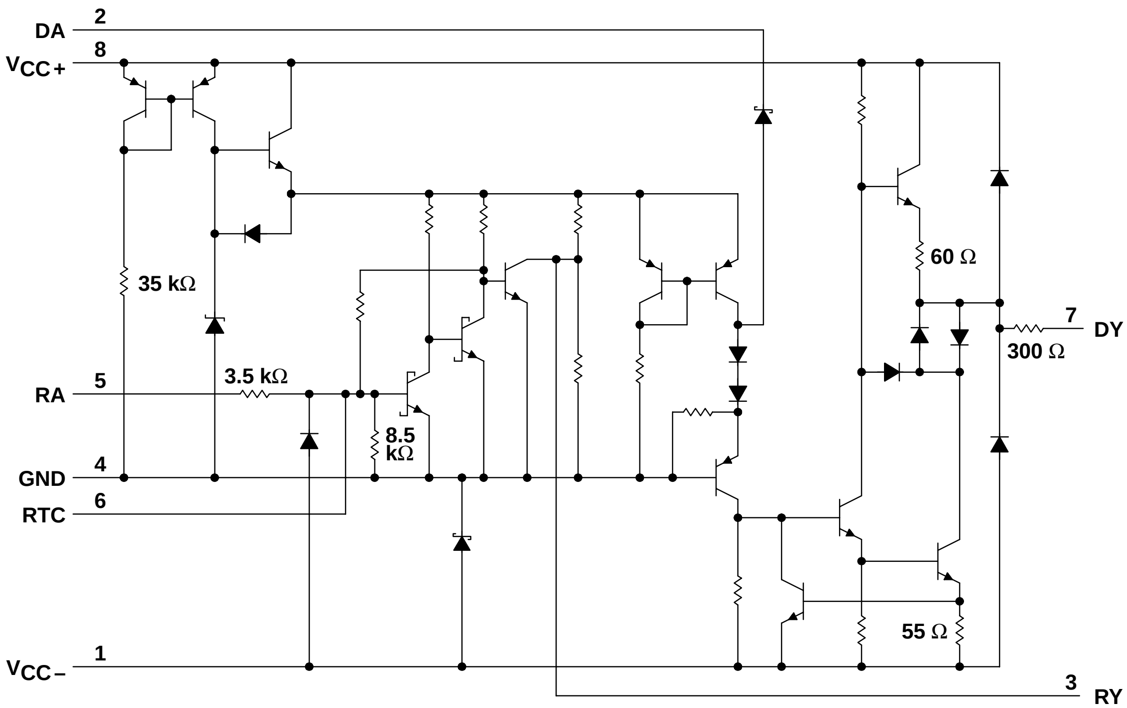
description

The SN751701 line driver and receiver is designed to satisfy the requirements of the standard interface between data terminal equipment and data communication equipment as defined by ANSI TIA/EIA-232-E. The driver used is similar to the SN75188. The receiver used is similar to the SN75189A. The device operates over a wide range of supply voltages (V_{CC} = ±4.5 V to ±15 V) from the included reference regulator.

logic diagram



schematic



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V_{CC+} (see Note 1)	–0.4 V to 18 V
Supply voltage range, V_{CC-} (see Note 1)	0.4 V to –18 V
Input voltage range, V_I: Driver	–5 V to 18 V
Receiver	–30 V to 30 V
Output voltage range, V_O: Driver	–25 V to 25 V
Receiver	–0.4 V to 7 V
Output current, I_O (D) Driver	50 mA
Response control current range, I_{RES}	–10 mA to 10 mA
Continuous total power dissipation	See Dissipation Rating Table
Package thermal impedance, θ_{JA} (see Note 2): P package	85°C/W
PS package	95°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C
Storage temperature range, T_{stg}	–65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltage values are with respect to the network ground terminal.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

			MIN	MAX	UNIT
V_{CC+}	Supply voltage		4.5	15	V
V_{CC-}	Supply voltage		–4.5	–15	V
$V_{I(D)}$	Input voltage, driver			15	V
$V_{I(R)}$	Input voltage, receiver		–25	25	V
I_{RESP}	Response control current		–5.5	5.5	mA
$I_{O(R)}$	Output current, receiver			24	mA
T_A	Operating free-air temperature	P package	–20	85	°C
		PS package	–20	70	

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

total device

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
I_{CCH+}	High-level supply current	V_{CC} = ±5 V	$V_{I(D)}$ = 2 V, $V_{I(R)} = V_{T+(max)}$, Output open		6.3	8.1	mA
		V_{CC} = ±9 V			9.1	11.9	
		V_{CC} = ±12 V			10.4	14	
I_{CCL+}	Low-level supply current	V_{CC} = ±5 V	$V_{I(D)}$ = 0.8 V, $V_{I(R)} = V_{T-(min)}$, Output open		2.5	3.4	mA
		V_{CC} = ±9 V			3.7	5.1	
		V_{CC} = ±12 V			4.1	5.6	
I_{CCH-}	High-level supply current	V_{CC} = ±5 V	$V_{I(D)}$ = 2 V, $V_{I(R)} = V_{T+(max)}$, Output open		–2.4	–3.1	mA
		V_{CC} = ±9 V			–3.9	–4.9	
		V_{CC} = ±12 V			–4.8	–6.1	
I_{CCL-}	Low-level supply current	V_{CC} = ±5 V	$V_{I(D)}$ = 0.8 V, $V_{I(R)} = V_{T-(min)}$, Output open		–0.2	–0.35	mA
		V_{CC} = ±9 V			–0.25	–0.4	
		V_{CC} = ±12 V			–0.27	–0.45	
I_{CC+}	Positive supply current	V_{CC} = ±5 V	$V_{I(R)} = V_{T+(max)}$, $V_{I(D)}$ = 0 V, V_{CC-} = 0 V, Output open		4.8	6.4	mA
		V_{CC} = ±12 V			6.7	9.1	

† All typical values are at T_A = 25°C.

electrical characteristics over recommended operating free-air temperature range, V_{CC+} = 12 V, V_{CC-} = –12 V (unless otherwise noted)

driver section

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V_{IH}	High-level input voltage			2			V
V_{IL}	Low-level input voltage					0.8	V
V_{OH}	High-level output voltage	$V_{I(D)}$ = 0.8 V, R_L = 3 kΩ	V_{CC} = ±5 V	3.2	3.7		V
			V_{CC} = ±9 V	6.5	7.2		
			V_{CC} = ±12 V	8.9	9.8		
V_{OL}	Low-level output voltage	$V_{I D)}$ = 2 V, R_L = 3 kΩ	V_{CC} = ±5 V		–3.6	–3.2	V
			V_{CC} = ±9 V		–7.1	–6.4	
			V_{CC} = ±12 V		–9.7	–8.8	
I_{IH}	High-level input current	$V_{I(D)}$ = 7 V				5	µA
I_{IL}	Low-level input current	$V_{I(D)}$ = 0 V			–0.73	–1.2	mA
$I_{OS(H)}$	High-level short-circuit output current	$V_{I(D)}$ = 0.8 V, $V_{O(D)}$= 0 V		–7	–12	–14.5	mA
$I_{OS(L)}$	Low-level short-circuit output current	$V_{I(D)}$ = 2 V, $V_{O(D)}$= 0 V		6.5	11.5	14	mA
r_O	Output resistance	V_{CC+} = 0 V, $V_{O(D)}$ = –2 V to 2 V		300			Ω

† All typical values are at T_A = 25°C.

switching characteristics, V_{CC+} = 12 V, V_{CC-} = –12 V, T_A = 25°C (unless otherwise noted)

driver section (see Figure 2)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low- to high-level output	R_L = 3 kΩ, C_L = 50 pF		340	480	ns
t_{PHL}	Propagation delay time, high- to low-level output			100	150	
t_{TLH}	Transition time, low- to high-level output	R_L = 3 kΩ, C_L = 50 pF		120	180	ns
t_{THL}	Transition time, high- to low-level output			105	160	
t_{TLH}	Transition time, low- to high-level output	R_L = 3 kΩ to 7 kΩ (see Note 3), C_L = 2500 pF		2.1	3	µs
t_{THL}	Transition time, high- to low-level output			2.1	3	

NOTE 3: The time is measured between 3 V and –3 V on output waveform.

electrical characteristics over recommended operating free-air temperature range, V_{CC+} = 12 V, V_{CC-} = –12 V (unless otherwise noted)

receiver section (see Figure 1) (see Note 4)

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V_{IT+}	Positive-going input threshhold voltage			1.2	1.9	2.3	V
V_{IT-}	Negative-going input threshhold voltage			0.6	0.95	1.2	V
V_{hys}	Hystresis voltage (V_{IT+} – V_{IT-})			0.6			V
$V_{O(H)}$	High-level output voltage	$V_{I(R)} = V_{T-(min)}$, I_{OL} = –10 μA	V_{CC+} = 5 V	3.7	4.1	4.5	V
			V_{CC+} = 12 V	4.4	4.7	5.2	
		$V_{I(R)} = V_{T-(min)}$, I_{OH} = –0.4 mA	V_{CC+} = 5 V	3.1	3.4	3.8	
			V_{CC+} = 12 V	3.6	4	4.5	
$V_{O(L)}$	Low-level output voltage	$V_{I(R)} = V_{T+(max)}$,	I_{OL} = 24 mA		0.2	0.3	V
I_{IH}	High-level input current	$V_{I(R)}$ = 25 V		3.6	6.7	8.3	mA
		$V_{I(R)}$ = 3 V		0.43	0.67	1	mA
I_{IL}	Low-level input current	$V_{I(R)}$ = –25 V		–3.6	–6.7	–8.3	mA
		$V_{I(R)}$ = –3 V		–0.43	–0.74	–1	mA
I_{OS}	Short-circuit output current	$V_{I(R)} = V_{T-(min)}$			–2.8	–3.7	mA

† All typical values are at T_A = 25°C.
NOTE 4: Response Control pin is open.

switching characteristics, V_{CC+} = 12 V, V_{CC-} = –12 V, T_A = 25°C (unless otherwise noted)

receiver section (see Figure 2)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low- to high-level output	R_L = 400 kΩ, C_L = 50 pF		150	240	ns
t_{PHL}	Propagation delay time, high- to low-level output			50	100	
t_{TLH}	Transition time, low- to high-level output	R_L = 400 kΩ, C_L = 50 pF		250	360	ns
t_{THL}	Transition time, high- to low-level output			18	35	

PARAMETER MEASUREMENT INFORMATION

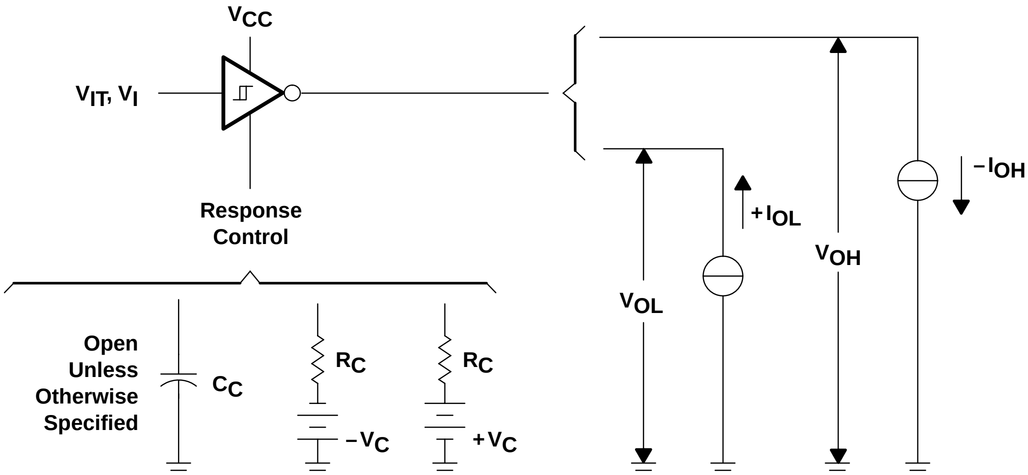
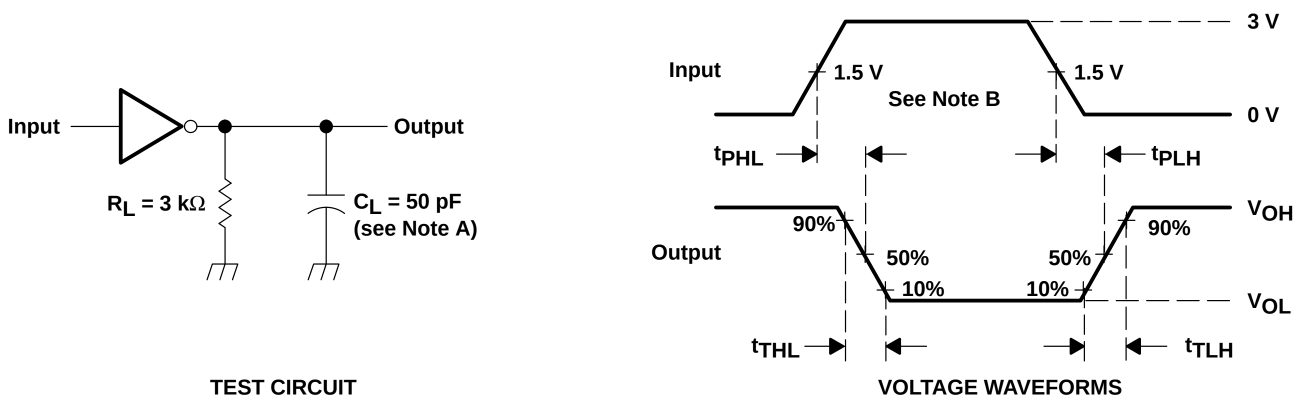


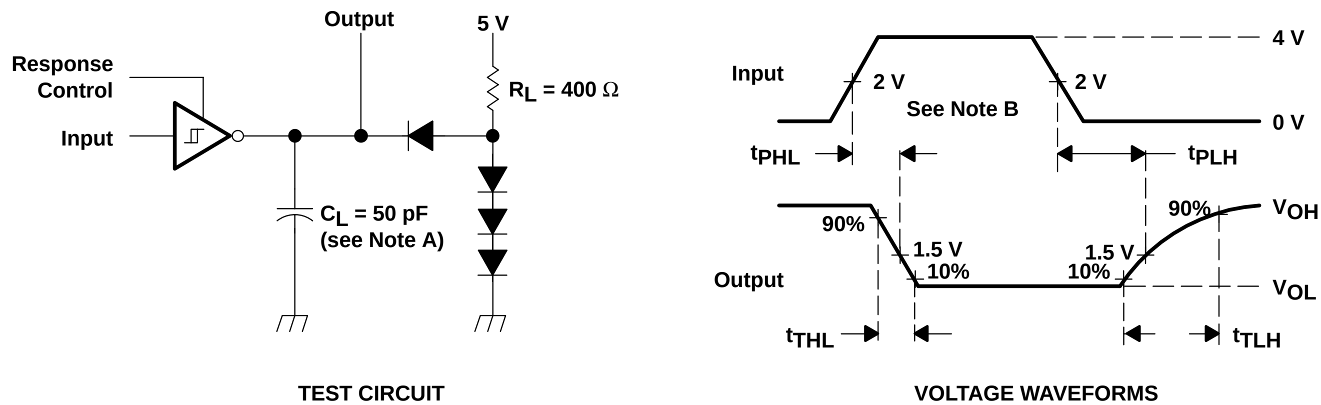
Figure 1. Receiver Section Test Circuit (V_{IT+}, V_{IT-}, V_{OH}, V_{OL})



NOTES: A. C_L includes probe and jig capacitance.
B. The input waveform is supplied by a generator having the following characteristics: Z_O = 50 Ω, t_W = 500 ns, $t_{TLH} \le 5$ ns, $t_{THL} \le 5$ ns.

Figure 2. Driver Section Switching Test Circuit and Voltage Waveforms

PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_L includes probe and jig capacitance.

B. The input waveform is supplied by a generator having the following characteristics: Z_O = 50 Ω, t_w = 500 ns, $t_{THL} \le 5$ ns, $t_{TLH} \le 5$ ns.

Figure 3. Receiver Section Switching Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

DRIVER
VOLTAGE TRANSFER CHARACTERISTICS

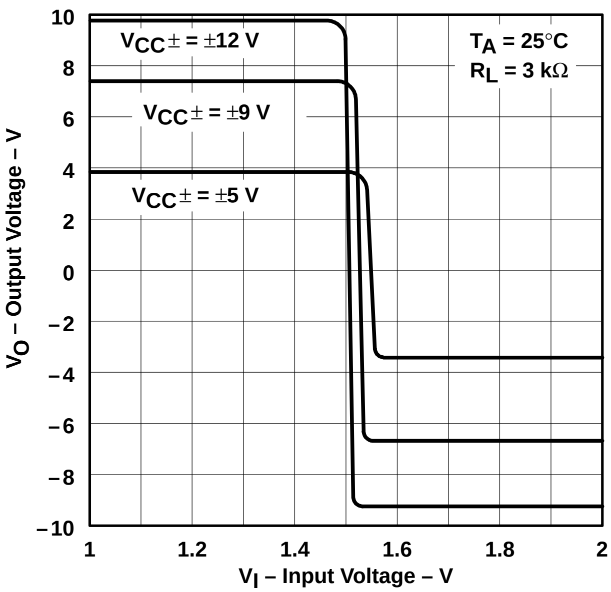


Figure 4

DRIVER
OUTPUT CURRENT
vs
OUTPUT VOLTAGE

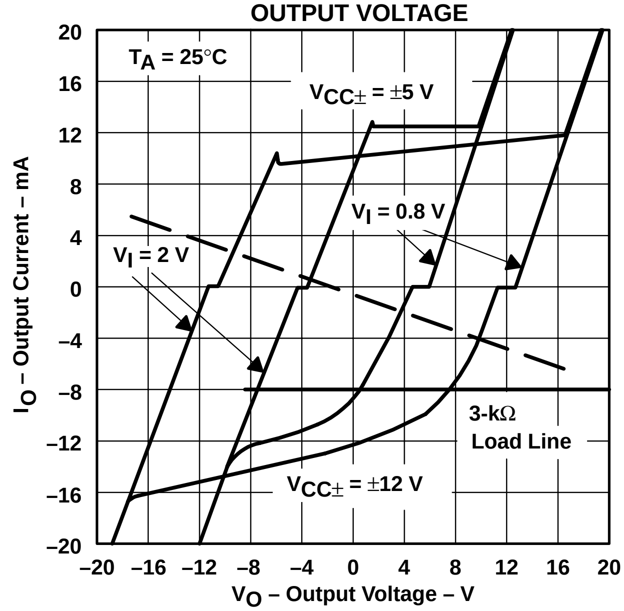


Figure 5

DRIVER
SHORT-CIRCUIT OUTPUT CURRENT
vs
FREE-AIR TEMPERATURE

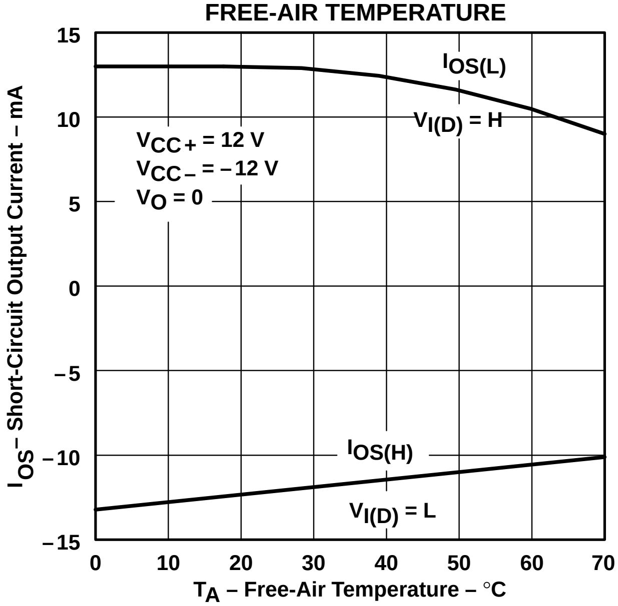


Figure 6

DRIVER
SLEW RATE
vs
LOAD CAPACITANCE

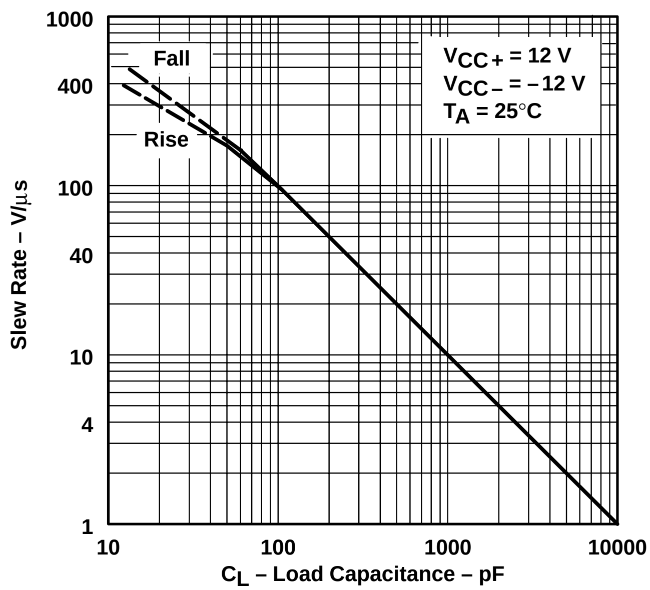


Figure 7

TYPICAL CHARACTERISTICS

RECEIVER
OUTPUT VOLTAGE
vs
INPUT VOLTAGE

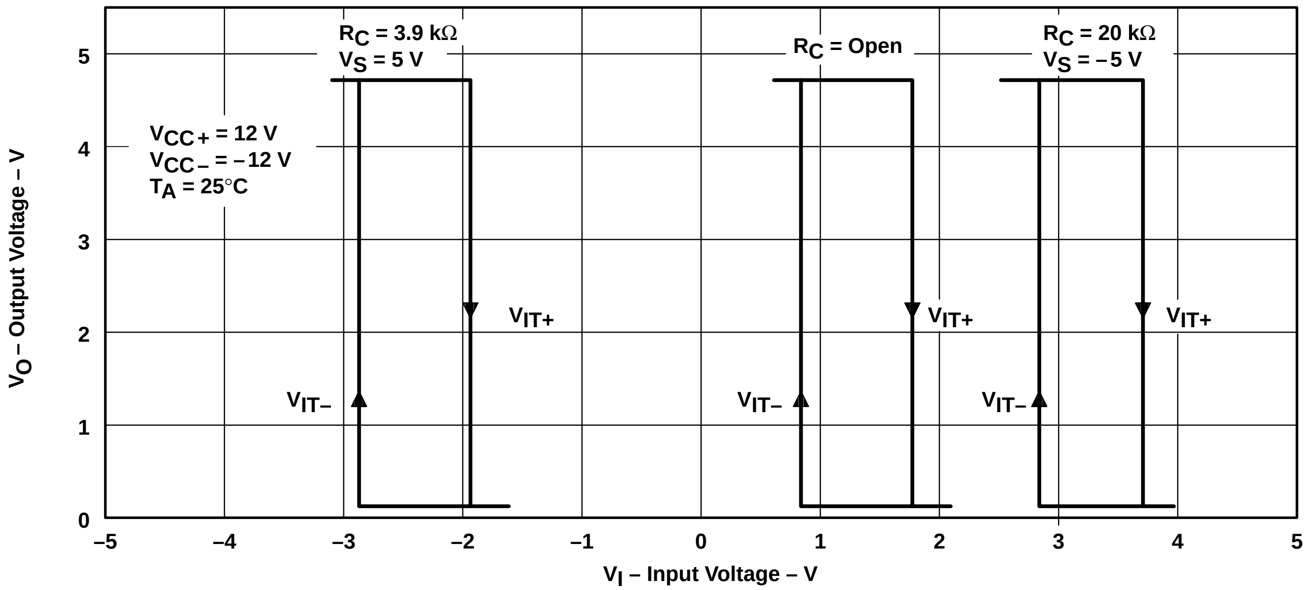


Figure 8

RECEIVER
OUTPUT VOLTAGE
vs
INPUT VOLTAGE

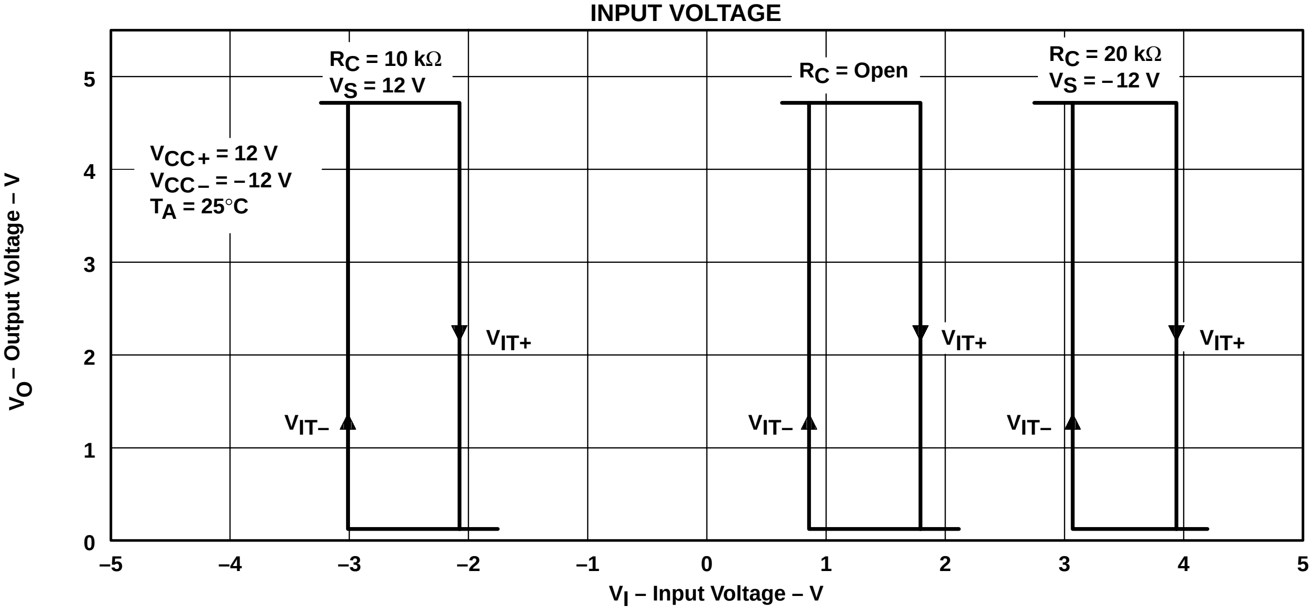


Figure 9

TYPICAL CHARACTERISTICS

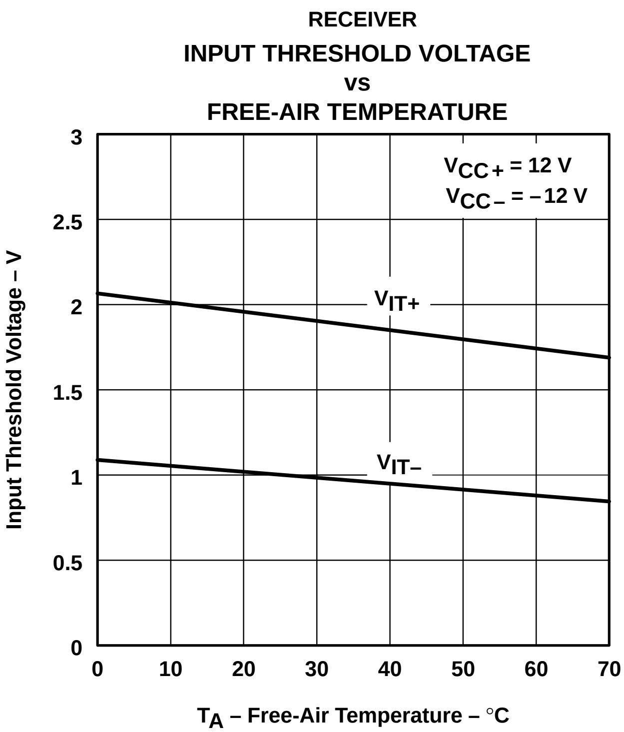


Figure 10

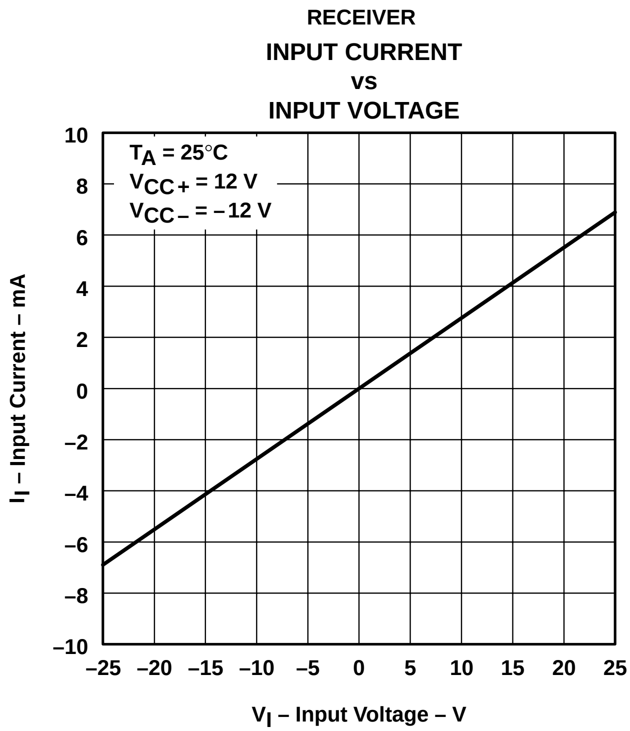


Figure 11

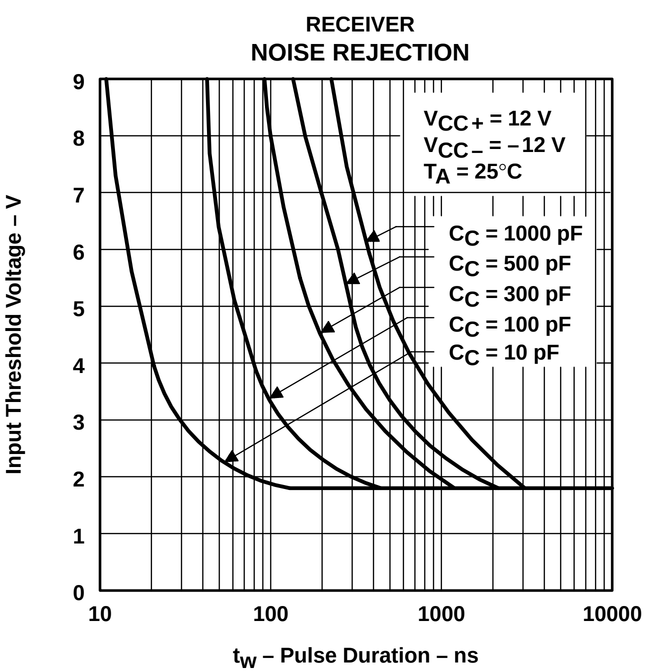


Figure 12

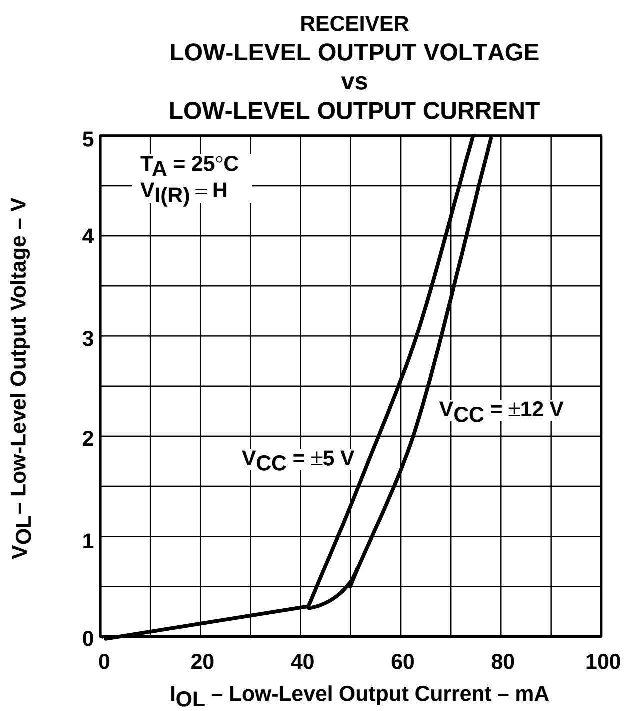


Figure 13

TYPICAL CHARACTERISTICS

RECEIVER
HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

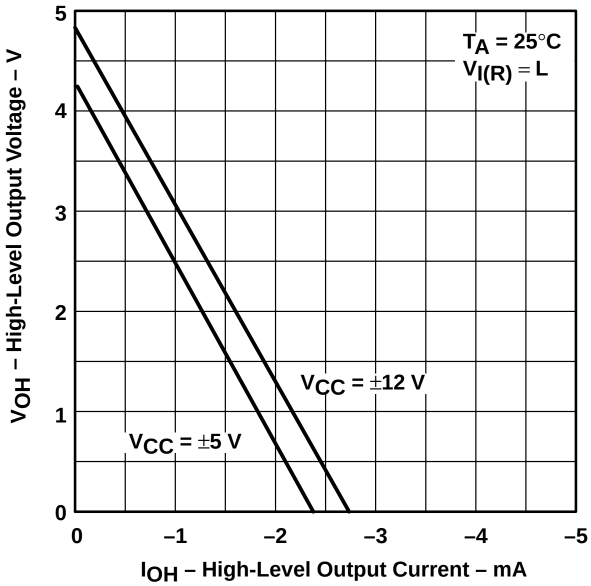


Figure 14

RECEIVER
OUTPUT VOLTAGE
vs
SUPPLY VOLTAGE

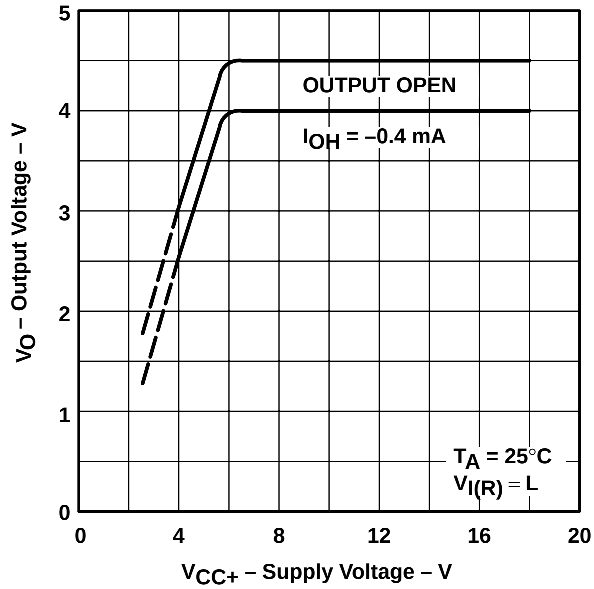


Figure 15

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